

TIMELINE

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Learning Z80 A Assembly Language Programming

In order to program in assembly language we must first look at the "Registers". Registers are pieces of memory located inside the Microprocessor. They are used to store, retrieve and manipulate numbers, characters, and addresses.

Each type of microprocessor has its own individual set of registers. The names of the registers provided for the z-80A are:
A,B,C,D,E,F,H,L,SP,PC,IX,IY,I,R

The registers A thru L plus I and R are eight bit registers.

Computers talk to themselves in binary arithmetic, in 0's and 1's. An eight bit register can hold eight 0's or eight 1's in any desired order. If all the bits in an 8-bit register are set to 1's i.e., 11111111, then the largest number the register can hold is 255 decimal. This is a very limited amount so the 8-bit registers can be paired. When paired, they are now 16-bit registers and can hold a maximum of 65535 decimal or 1111111111111111 binary.

A brief description of the registers and their pairings follows:
"AF" - A is called the accumulator. It is the primary source and destination for most arithmetic operations.

"F" - is the flags or status register. It is an extremely important one. Certain instructions will set or reset these flags as appropriate. It is an 8-bit register with six flags. The names and a brief description of the flags follows:

"s" sign takes on the value of bit 7 of the accumulator after a mathematical operation.

"z" zero if the result of an instruction is zero this flag is set

aux carry or half carry-set if a carry was needed from bit 3 to bit 4

P/O = parity/overflow. A dual purpose flag. First it indicates the number of 1's (even or odd) in the 8-bit accumulator after an operation is completed. Second the overflow is set if the sign of a number was changed. More details on this later.

"n" = subtract status set to 1 is subtraction, 0 otherwise.

"c" = carry set if an operation resulted in a number that was larger than the register operated upon could hold. This is not the same as overflow.

"PC" - Historically this register is called the byte counter. This register pair, more on pairs later, can be used to count iteration of a program (similar to for-next in basic).

"DE" - sometimes called the destination register. This is just another 16-bit paired register.

"HL" - The primary address pointer. This register is generally used to hold an address. When you want to do something to a specific address it is held in HL. For instance: if you want to load a number into an address you usually load HL with the address then load the contents of HL (the address pointed to by the HL pair) with the number desired. Much more on this later.

"SP" - called stack pointer. This register is used to make a stack. Stacks are very important in programming. One use for the stack is to preserve the values in registers by "pushing" onto the stack then "popping" them after. One important point to remember about stacks is that first on the stack is the last off. Failure to do this operation will definitely cause a crash.

"PC" - the program counter. Used by the computer to remember where the next instruction to be executed is located. It cannot be manipulated directly by instructions but many of the jump (goto) and call (gosub) instructions manipulate it.

CONT. (2)

Machine Code Graphics: The T/S 1000 (and ZX81) Display File

If you want to program fast (or medium speed) games on the T/S1000, Sinclair BASIC is not appropriate. Z80 machine code is currently the most convenient to use. However, with machine code (MC) you do not have the convenience of the PRINT or PLOT commands. To display characters on the screen you have to POKE the appropriate character code into the proper address of the Display-File (D-File). It is necessary to understand the layout and function of the D-File to be able to use it. The following discussion attempts to describe the D-File of a 16K machine. 1K or 2K D-Files are arranged very differently.

The D-File of a T/S1000 contains the information for the current screen display that you are viewing when your computer is operating. It contains a strip of 793 Bytes in RAM. Each Byte contains either a code for a character to be placed in a specific screen location or a 118 (76 in hex) that tells the machine to end a line. The D-File does not stay in one place in the RAM. However, you can always find it since the current address of the D-File is in a system variable that is stored in addresses 16396 and 16397 (400C and 400D in hex). The D-File starting address is always:

PEEK 16396 + 256*PEEK 16397.

Now let's examine the D-File. Enter and RUN the program in Listing 1:

LISTING 1

```
10 LET P=PEEK 16396+256*PEEK 16397
20 DIM A(800)
100 FOR F=0 TO 792
110 LET A(F+1)=PEEK (P+F)
120 NEXT F
200 FOR F=0 TO 792
210 PRINT A(F+1); " ";
220 NEXT F
```

The program displays a blank screen while it copies the D-File into the A array. It then prints the D-File of the blank screen onto the screen (the screen will run out of space so use the CONT command to complete the program). As you will see the D-File begins with a 118. There are then 32 0's which mean that the first line is all spaces (see the character set in the appendix of the T/S 1000 Manual). If the top row displayed a row of A's then there would have been 32-38's instead. If you don't believe me add these lines to the program:

```
30 PRINT "AAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAA" (32 A's)
130 CLS
```

CONT. (2)

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CONT. FROM (1)

"IX", "IY" - are index registers. They are used similar to HL, as the usually hold addresses but require an offset or displacement with them. For instance if you have a table of data and you want the 12th item from it you could load IX with the address of your table plus 12.

"I" and "R" - esoteric registers. I is called the interrupt vector and is used to store the page address of an interrupt response routine. R is called the refresh register and the most refreshing thing about this one is that it is not essential to programming in assembly language.

Binary numbers are extremely hard to program with. The program on the right contains an error can you see it?

00111010	00111010
01100000	01100000
00000000	00000000
01000111	01000111
00111010	01110010
01100001	01100001

To correct this, most assembly language is done in Hexadecimal number system. Hexadecimal is directly transferable to binary. Here is the same program in hexadecimal.

3A	3A
60	60
00	00
47	47
3A	72
61	61

To count in Hex (as it is called) we need to use letters as numbers. The number 10 in hex is 16 in decimal. So we must fill the gap between 9 decimal and 16 decimal. Here are the hex digits and their binary equivalents:

01	0001
02	0010
03	0011
04	0100
05	0101
06	0110
07	0111
08	1000
09	1001
0A	1010
0B	1011
0C	1100
0D	1101
0E	1110
0F	1111

In the next article we will use this information to enter a basic program that will help us understand and enter machine code.

F.J.M.
6/3/83

CONT. FROM (1)

After the 0's there is a 118 which tells the machine to end the line. There are then 23 more lines of 33 Bytes (32-0's and 1-118). If any of the 0's were replaced with another character code that character would be printed on the screen.

A handy representation of the D-File is shown Figure 1. It shows each of the screen spaces plus the right hand column which will have all 118's. If you add the number in a specific box to the beginning address of the D-File you can access that screen space. For example, let's put an "inverse space" into space 410 with this program:

```
10 LET P = PEEK 16396 + 256*PEEK 16397
20 POKE P + 410, 128
```

Any character can be placed on the screen using this method. Now add this line and RUN:

```
30 POKE P + 727,23
```

You can see that the 23rd line is now available to us which we cannot access with PRINT and PLOT. The entire screen is available to us in MC programming. Now you might like to try placing different characters to different parts of the screen after defining P as in line 10.

This technique is handy for moving graphics even in BASIC. Figure 1 shows that adding 33 to an address of a space locates the space directly under it. This is important for up and down movement. Diagonal movement is simulated by adding or subtracting 32 or 34 as in the program in Listing 2:

LISTING 2

```
10 LET P=PEEK 16396+256*PEEK 1
6397
20 LET X=-34
30 LET T=345
100 POKE P+T,23
105 LET S=T
110 LET T=T+X
120 IF T>725 OR T<1 THEN LET X=
X*(-1)
130 IF T>725 OR T<1 THEN GOTO 1
140 POKE P+S,0
150 GOTO 100
```

Changing the value of X in line 20 will cause changes in the movement.

While the examples in this article were in BASIC the principles are necessary for use in MC programming. My article in the May BAZUG 83 newsletter uses this knowledge for a simple MC moving graphic program. That article is reprinted in this issue.

Joel Brody

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PROGRAMMING TIPS BY KENDRIC

(1) SAVING BYTES ON YOUR MENUS

LINE 900 (BELOW) IS A COMPLETE MENU. NOTE HOW COMMAS AND SPACES HAVE BEEN USED SO THAT IT WILL PRINT OUT EXACTLY AS THE MENU THAT IS WRITTEN BELOW IN THE MORE GENERAL FORMAT (LINES 900-960). THE BIG DIFFERENCE, HOWEVER, IS THAT LINE 900 USES ONLY 229 BYTES, BUT THE MORE GENERAL FORMAT USES 506 BYTES.

```
900 PRINT "WHAT IS INCORRECT?"
901 PRINT "1 MEMBER NO.", "2 DUES MO. AND YR.", "3 SPECIAL CODES", "4 FIRST NAMES", "5 LAST NAME", "6 STREET ADDRESS", "7 CITY", "8 STATE", "9 ZIP", "10 PHONE", "11 EVERYTHING, DELETE LISTING", "12 NOTHING"
```

```
900 PRINT AT 1,1;"WHAT IS INCORRECT?"
901 PRINT AT 2,1;"1 MEMBER NO."
902 PRINT AT 3,1;"2 DUES MO. AND YR."
903 PRINT AT 4,1;"3 SPECIAL CODES"
904 PRINT AT 5,1;"4 FIRST NAME"
905 PRINT AT 6,1;"5 LAST NAME"
906 PRINT AT 7,1;"6 STREET ADDRESS"
907 PRINT AT 8,1;"7 CITY"
908 PRINT AT 9,1;"8 STATE"
909 PRINT AT 10,1;"9 ZIP"
910 PRINT AT 11,1;"10 PHONE"
911 PRINT AT 12,1;"11 EVERYTHING, DELETE LISTING"
912 PRINT AT 13,1;"12 NOTHING"
```

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TIMELINEZ REVIEWS by David Kinkad

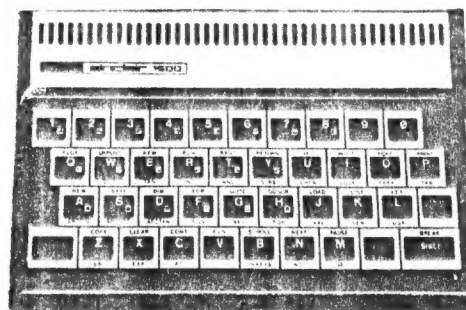
EUREKA! There it was amidst the volumes of cutsize game books and reworded user guides, a volume with the unpretentious name "MASTERING YOUR TIMEX/SINCLAIR 1000 PERSONAL COMPUTER".

"So what's new..." you ask. Tim Hartnell and Dilwyn Jones have done an exceptional job of taking the bewildered newcomer to TIMEX from the basics through some sophisticated programming. Each of its 18 chapters is divided into subchapters and carefully demonstrate the techniques necessary to master the Timex/Sinclair.

The programs provided are very useful (not just asteroid blasting) and contain an explanation of why they are listed as they are. It also provides some helpful information on saving space in your programs.

The authors are from Britain. Tim Hartnell is the editor of ZX Computing and founder/coordinator for the National ZX Users' Club. Dilwyn Jones runs a users group in North Wales and is a technician in the Welsh broadcasting industry.

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As the Sinclair ZX has evolved into the TIMEX TS so has Sinclink evolved into Timelinez. With this issue we begin a joint effort to produce a new Bay area wide Timex user Newsletter. It's rewarding to see that our efforts to form a true San Francisco Bay Area user group are beginning to bear fruit. This new monthly newsletter is the first example of increased communication between users that can result from an association of local user groups. In this issue you'll find sections from the North Bay, Peninsula and the South Bay groups.

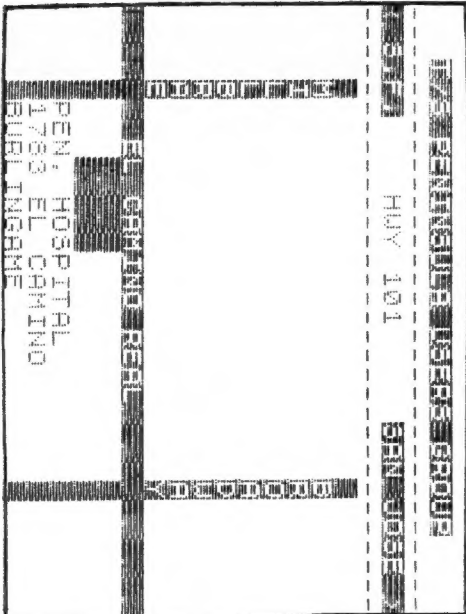
We welcome and seek the participation of all Bay area user groups. We want to bring to all users the ideas, questions, answers, experiences and expertise that resides in each local group.

As the amount of hardware and software grows it becomes important to know, before you buy, just what is the wheat so that you don't get the chaff. We hope to use Timeliness to collect and publish your reviews of these new products. Already the North Bay group has made impressive progress in this area.

All readers should recognize and thank George Mockridge for pushing to make this idea become reality. We also must thank George, Teddy Helderman, Dave Kinkade, Frank Moura and Rick Link for spending their entire Saturday working to put this issue together. Without their effort there would be no newsletter at all!

All readers should also recognize what it takes to continue to put out a quality newsletter. We need your reviews and articles on a wide of hardware or software that you have developed. We'll even help you write them. We also need advertisements

MANY THANKS TO BOB ORAFELT FOR HIS FINE SPECTRUM DEMO. AT OUR LAST MEETING, THANKS ALSO TO NEIL STECKLEY FOR GETTING OUT PUBLICITY ABOUT OUR GROUP. AS WE GROW, WE LOOK FORWARD TO MANY ENJOYABLE UNDERTAKINGS.



MEETINGS ARE HELD ON THE 3RD SUNDAY OF EACH MONTH, 3-5 PM
JUNE 19TH
JULY 17TH

WE HAVE BEEN ASKED NOT TO PARK IN THE VISITOR LOT, PLEASE USE THE LOTS SURROUNDING THE VISITOR LOT.

ELECTRICAL OUTLETS AND TABLES ARE AVAILABLE SO BRING YOUR EQUIP. AND EXTENSION CORDS IF POSSIBLE.

CATERING SERVICE IS AVAILABLE AND FAMILIES ARE WELCOME.

FOR MORE INFORMATION CONTACT:

GEORGE HOCKRIDGE
263 GATEWAY NO. 107
PACIFIC, CA 94044
(415) 355-3198

SEND NEWSLETTER CONTRIBUTIONS TO:

FRANK HOURA
838 CHENERY ST.,
SAN FRANCISCO, CA. 94131

NEW MEMBERSHIP PROPOSALS WERE VOTED ON AT THE LAST MEETING. MAY 19 OF THE MAY 19 MEETING--THE OFFICIAL EBBZUG MEMBERSHIP SCHEDULE 1980

FULL (NEWSLETTER AND LIBRARY PRIVILEGES) \$15.00 YEAR
NEWSLETTER ONLY \$10.00 YEAR
STUDENT (THRU HIGH SCHOOL) \$ 8.00 YEAR

MONTHLY DUES MAY ALSO BE PAID AT EACH MEETING WHICH WILL GUARANTEE TWO NEWSLETTERS BUT DOES NOT INCLUDE LIBRARY PRIVILEGES. HALF YEAR RATES ARE ALSO AVAILABLE ON REQUEST. **NOTE** IF YOU RECEIVED YOUR MEMBERSHIP CARD AT THE LAST MEETING YOU MIGHT HAVE NOTICED THAT THE THERMAL PAPER HAS REJECTED WITH THE PLASTIC COVER. WE WILL HAVE NEW CARDS AT THE NEXT MEETING.

MEETINGS FOR OUR NEXT MEETING INCLUDES THE NOMINATION AND ELECTION OF NEW OFFICERS. THIS IS AN IMPORTANT ACTIVITY SO PLEASE BE PRESENT AT OUR NEXT GATHERING.

ROBOTEK

Computer Systems
Tom Kilpatrick
10545 B SAN PABLO
EL CERRITO, CA 94530
(415) 524-3730

Timelink

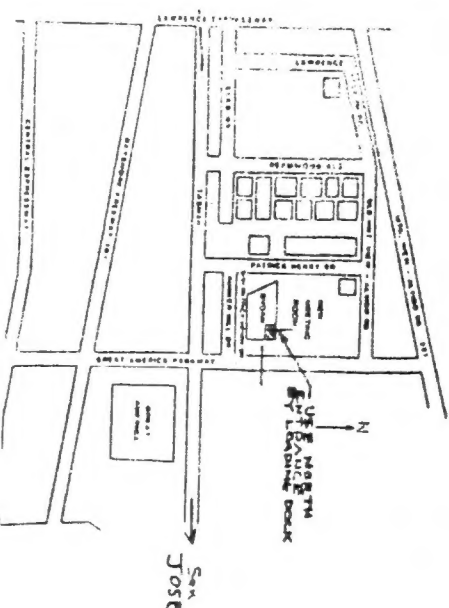
THIS IS YOUR NEWSLETTER. IT WILL BE AS GOOD AS YOU MAKE IT. HOW ABOUT CONTRIBUTING AN ARTICLE, REVIEW, LETTER, OR WHATEVER? THANKS.

to help cover the cost of production and mailing. We also need help. No, it won't take a whole Saturday of your time now that we're off and flying. As a result of this new organization our group will now be identified as the South Bay T/S User Group. We will retain the name Slnclink for our section of Timelink.

Our meetings are held on the last Tuesday of each month (not necessarily the 4th Tues.!) between 7 and 10 pm at the Dysan Corp. facilities - see map. At our next meeting Jim McMurry will present our second seminar on machine code programming. He will instruct on how to program in ML and will have several example ML programs available. The meetings are open and all are welcome to attend. See you there!

Best wishes,

Paul D. Perreault
President



The regular meeting of the TUG is: 7:00 to 10:00 PM, the LAST TUESDAY of each month.
DYSAN Corporation
3401 Patrick Henry Drive
Santa Clara, CA.
Use the NORTH entrance by the loading dock.

A MYSTERY PROGRAM!

The following "MYSTERY PROGRAM" is by a full tilt and was first published in the February 1982 issue of a British magazine called "YOUR COMPUTER". Here is the program with a slight variation:

```
1 PRINT "HERE IS A 10 YEAR BINARY COUNT!"
2 LET A=PEEK 16396+256*PEEK 16397+32
3 LET B=PEEK A=157
4 POKE A,157-B
5 LET A=A-1
6 GOTO 2+B
```

The mystery is to discover what it does and how it works. Type it in your computer and RUN it before reading further.

Now that you're reading further, I'll explain the "mystery" to me. The first line just reserves 32 spaces (for 1K or 2K computers). Line two sets A to the value on the left of the first line of the display file. Line 3 looks like a mistake!! However the program works. Are you setting A to 157 and PEEKing at ROM address 157? ALL WRONG! The next line POKEs A so A can't be 157. After some more confusion I found line 3 reads as follows: LET B = either a 1 if the number at address A is 157 (true) or LET B = a 0 if the number is other than 157 (false). The first equal sign tells the computer what B is (assignment) and the second equal sign tells the computer to test for true or false (boolean). So B is either 1 or 0.

Line 4 pokes an inverse 1 if B is 0 or an inverse 0 if B is 1.

Line 5 sets the address one place to the left.

Line 6 loops back to line 2 if PEEK A was an inverse 0 or to line 3 if an inverse 1.

I hope all this is now clear. The next mystery is for you to solve. How do you save this program?

Bob Orrfelt

ISMOVE: A Simple Moving Graphic in Machine Code

When you get your first computer and learn a few BASIC commands one of the first things you do is make something move. A new T/S 1000 user may produce a program like this:

It is quite exciting to see the moving "inverse space" (IS) at first, but after a while you realize how slow it moves and that Sinclair BASIC has very limited facilities for speeding it up. The following 280 machine code program works the same way as the "IS" BASIC program does. However it is executed so fast that a DELAY subroutine had to be added so your eye and display screen can deal with it. Its great speed also enables us to add a speed control facility in an accompanying BASIC program.

ISMOVE is 34 Bytes long. If you don't use an assembler or have a favorite machine code loading program type in the following program:

```
1000 REM *****
1010 REM *****
1020 REM *****
1030 REM *****
1040 REM *****
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1070 REM *****
1080 REM *****
1090 REM *****
1100 REM *****
1110 REM *****
1120 REM *****
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1190 REM *****
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1880 REM *****
1890 REM *****
1900 REM *****
1910 REM *****
1920 REM *****
1930 REM *****
1940 REM *****
1950 REM *****
1960 REM *****
1970 REM *****
1980 REM *****
1990 REM *****
2000 REM *****
2010 REM *****
2020 REM *****
2030 REM *****
2040 REM *****
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2070 REM *****
2080 REM *****
2090 REM *****
2100 REM *****
2110 REM *****
2120 REM *****
2130 REM *****
2140 REM *****
2150 REM *****
2160 REM *****
2170 REM *****
2180 REM *****
2190 REM *****
2200 REM *****
2210 REM *****
2220 REM *****
2230 REM *****
2240 REM *****
2250 REM *****
2260 REM *****
2270 REM *****
2280 REM *****
2290 REM *****
2300 REM *****
2310 REM *****
2320 REM *****
2330 REM *****
2340 REM *****
2350 REM *****
2360 REM *****
2370 REM *****
2380 REM *****
2390 REM *****
2400 REM *****
2410 REM *****
2420 REM *****
2430 REM *****
2440 REM *****
2450 REM *****
2460 REM *****
2470 REM *****
2480 REM *****
2490 REM *****
2500 REM *****
2510 REM *****
2520 REM *****
2530 REM *****
2540 REM *****
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2690 REM *****
2700 REM *****
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2740 REM *****
2750 REM *****
2760 REM *****
2770 REM *****
2780 REM *****
2790 REM *****
2800 REM *****
```

Now type in the following numbers starting with 42 (16514 is the address of the first Byte). This is the decimal machine code listing:

```
16514 16515 16516 16517 16518 16519 16520 16521 16522 16523 16524 16525 16526 16527 16528 16529 16530 16531 16532 16533 16534 16535 16536 16537 16538 16539 16540 16541 16542 16543 16544 16545 16546 16547 16548 16549 16550 16551 16552 16553 16554 16555 16556 16557 16558 16559 16560 16561 16562 16563 16564 16565 16566 16567 16568 16569 16570 16571 16572 16573 16574 16575 16576 16577 16578 16579 16580 16581 16582 16583 16584 16585 16586 16587 16588 16589 16590 16591 16592 16593 16594 16595 16596 16597 16598 16599 16600 16601 16602 16603 16604 16605 16606 16607 16608 16609 16610 16611 16612 16613 16614 16615 16616 16617 16618 16619 16620 16621 16622 16623 16624 16625 16626 16627 16628 16629 16630 16631 16632 16633 16634 16635 16636 16637 16638 16639 16640 16641 16642 16643 16644 16645 16646 16647 16648 16649 16650 16651 16652 16653 16654 16655 16656 16657 16658 16659 16660 16661 16662 16663 16664 16665 16666 16667 16668 16669 16670 16671 16672 16673 16674 16675 16676 16677 16678 16679 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16846 16847 16848 16849 16850 16851 16852 16853 16854 16855 16856 16857 16858 16859 16860 16861 16862 16863 16864 16865 16866 16867 16868 16869 16870 16871 16872 16873 16874 16875 16876 16877 16878 16879 16880 16881 16882 16883 16884 16885 16886 16887 16888 16889 16890 16891 16892 16893 16894 16895 16896 16897 16898 16899 16900 16901 16902 16903 16904 16905 16906 16907 16908 16909 16910 16911 16912 16913 16914 16915 16916 16917 16918 16919 16920 16921 16922 16923 16924 16925 16926 16927 16928 16929 16930 16931 16932 16933 16934 16935 16936 16937 16938 16939 16940 16941 16942 16943 16944 16945 16946 16947 16948 16949 16950 16951 16952 16953 16954 16955 16956 16957 16958 16959 16960 16961 16962 16963 16964 16965 16966 16967 16968 16969 16970 16971 16972 16973 16974 16975 16976 16977 16978 16979 16980 16981 16982 16983 16984 16985 16986 16987 16988 16989 16990 16991 16992 16993 16994 16995 16996 16997 16998 16999 17000 17001 17002 17003 17004 17005 17006 17007 17008 17009 17010 17011 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18008 18009 18010 18011 18012 18013 18014 18015 18016 18017 18018 18019 18020 18021 18022 18023 18024 18025 18026 18027 18028 18029 18030 18031 18032 18033 18034 18035 18036 18037 18038 18039 18040 18041 18042 18043 18044 18045 18046 18047 18048 18049 18050 18051 18052 18053 18054 18055 18056 18057 18058 18059 18060 18061 18062 18063 18064 18065 18066 18067 18068 18069 18070 18071 18072 18073 18074 18075 18076 18077 18078 18079 18080 18081 18082 18083 18084 18085 18086 18087 18088 18089 18090 18091 18092 18093 18094 18095 18096 18097 18098 18099 18100 18101 18102 18103 18104 18105 18106 18107 18108 18109 18110 18111 18112 18113 18114 18115 18116 18117 18118 18119 18120 18121 18122 18123 18124 18125 18126 18127 18128 18129 18130 18131 18132 18133 18134 18135 18136 18137 18138 18139 18140 18141 18142 18143 18144 18145 18146 18147 18148 18149 18150 18151 18152 18153 18154 
```

TIMELINEZ

8



TELEPHONE LIST

LOAD "FONE"

FEATURES:

Search Routine: alpha-numeric, finds full name or first letter of names, or finds a phone number by the last 4 digits. (i.e. that forgotten long distance call on your phone bill). A sorting sub-routine saves search time by moving more frequently searched items to the top of the list. A floating end-point saves time by not searching the unused section of the list.

MENU DRIVEN COMANDS: LIST... (prints out all list items)
ADD... (allows additions to list)
DELETE... (removes from list)
SEARCH... (finds name/number)
RECALL... (finds number/name)
FILE... (files amended list)

SET-UP ROUTINE: Takes only a minute, 1 time.
Allows you to name the list.
Allows you to set the size of list.
Clears a used list.

THE SET-UP COMMANDS ARE: L ENTER
-space- ENTER
RUN 2 ENTER
LET BS="name of list" ENTER
LET A=size of list ENTER
95 ENTER
GOTO 30 ENTER

THESE COMMANDS ARE ENTERED WITHOUT LINE NUMBERS

Use GOTO 1 ENTER, after a -break- or an error code, to return to the Menu. On occasion you might get an error code 5/lines, this happens when your search returns more lines than the screen can hold. C ENTER will allow you to continue. You can input 0,1, or up to 18 letters to search, i.e. SMITH will return all Smith names, including Smiths. If you're not sure of the spelling, Search SM and get Smith, Smiths, and Smythe John.

NOTES: This program was written for 16K, TIMEX 1000, and will hold 300+ names/numbers in 16K. If you have 32K memory you can let A=700 and the list can hold 700 names, with a corresponding increase in LOAD time. I recommend a "size of list" of 100 as a convenient size as this fits nicely on a C-5 tape. BS is any name you wish to head the list, it can be up to 14 characters long. Line 95 is a list of set up commands in case you lose this sheet. L ENTER after you LOAD the first time, prints out information stored in array; it is removed by GOTO 30 when you set up.

SET-UP ROUTINE
ENTER THESE COMMANDS-NO LINE NO.

```
L
SPACE
RUN 2
LET BS="14 MAX"
LET A=50
95
GOTO 30

1 GOTO 60
10 REM COPYRIGHT 1983 GERALD F
RATON
20 DIM B$(14)
30 DIM N$(A,32)
40 LET B=0
50 LET B$=""

60 CLS
70 PRINT B$;" TELEPHONE LIST"
80 PRINT
90 PRINT "LIST ALL NAMES NUMBE
RS" TAB 27;"KEY L" ADD NAME NUM
BER" TAB 27;"KEY A" DELETE NAME
NUMBER" TAB 27;"KEY D" SEARCH
FOR NAME" TAB 27;"KEY S" RECAL
L NUMBER" TAB 27;"KEY R" TO FI
LE ON TAPE" TAB 27;"KEY F"
95 PRINT "SET-UP ROUTINE"
"ENTER THESE COMMANDS-NO LINE N
O" TAB 27;"SPACE" RUN 2" LET
B$="14 MAX" TAB 27;"LET A=50" 95
" GOTO 30"
110 IF INKEY$="" THEN GOTO 100
110 IF INKEY$="L" THEN GOTO 130
120 IF INKEY$="A" THEN GOTO 340
130 IF INKEY$="D" THEN GOTO 620
140 IF INKEY$="S" THEN GOTO 810
150 IF INKEY$="R" THEN GOTO 115
160 IF INKEY$="F" THEN GOTO 125
170 GOTO 100
180 CLS
190 LET X=0
200 LET J=0
210 LET X=X+1
220 LET J=J+1
230 PRINT N$(X)
240 IF J=20 THEN GOSUB 290
250 IF X=B THEN GOTO 210
260 PRINT "LAST ITEM ON LIST"
270 GOSUB 290
280 GOTO 80
290 PRINT
300 PRINT "KEY "ENTER" TO CON
TINUE"
310 INPUT Z$
320 CLS
330 RETURN
340 CLS
350 LET B=B+1
360 LET X=1
370 IF B=A OR X=B THEN GOTO 410
380 IF N$(X)=B$ THEN GOTO 490
390 LET X=X+1
400 GOTO 370

410 PRINT "LIST FULL"
420 LET B=B-1
430 FOR J=1 TO 23
440 PRINT " ";
450 NEXT J
460 PRINT
470 PRINT
480 GOTO 70
490 CLS
500 LET B=X
510 PRINT "NAME ?"
520 INPUT N$(X, TO 18)
530 PRINT "AREA CODE ?"
540 INPUT N$(X,20 TO 22)
550 PRINT "FIRST 3 DIGITS OF PH
ONE NO.?"
560 INPUT N$(X,25 TO 27)
570 PRINT "LAST 4 DIGITS ?"
580 INPUT N$(X,29 TO 32)
590 PRINT N$(X)
600 PAUSE 150
610 GOTO 60
620 CLS
630 PRINT "DELETE NAME ?"
640 INPUT Z$
650 LET X=1
660 IF N$(X, TO LEN Z$)=Z$ THEN
GOTO 700
670 IF X=B THEN GOTO 860
680 LET X=X+1
690 GOTO 660
700 CLS
710 PRINT N$(X)
720 PRINT
730 PRINT "TO DELETE" TAB 15;"H
EY "D" "ENTER"
740 PRINT
750 PRINT "FOR NEXT "Z$;" "
760 PRINT "KEY "ENTER"
770 INPUT Z$
780 CLS
790 IF Z$="D" THEN GOTO 670
800 PRINT "N$(X) DELETED"
810 LET N$(X)=B$
820 FOR X=X TO B-1
830 LET N$(X)=N$(X+1)
840 NEXT X
850 LET N$(B)=B$
860 LET B=B-1
870 GOTO 890
880 PRINT "LAST ITEM"
890 PAUSE 100
900 GOTO 60
910 CLS
920 PRINT "NAME ?"
930 INPUT Z$
940 LET F=0
950 LET X=1
```

```
410 PRINT "LIST FULL"
420 LET B=B-1
430 FOR J=1 TO 23
440 PRINT " ";
450 NEXT J
460 PRINT
470 PRINT
480 GOTO 70
490 CLS
500 LET B=X
510 PRINT "NAME ?"
520 INPUT N$(X, TO 18)
530 PRINT "AREA CODE ?"
540 INPUT N$(X,20 TO 22)
550 PRINT "FIRST 3 DIGITS OF PH
ONE NO.?"
560 INPUT N$(X,25 TO 27)
570 PRINT "LAST 4 DIGITS ?"
580 INPUT N$(X,29 TO 32)
590 PRINT N$(X)
600 PAUSE 150
610 GOTO 60
620 CLS
630 PRINT "DELETE NAME ?"
640 INPUT Z$
650 LET X=1
660 IF N$(X, TO LEN Z$)=Z$ THEN
GOTO 700
670 IF X=B THEN GOTO 860
680 LET X=X+1
690 GOTO 660
700 CLS
710 PRINT N$(X)
720 PRINT
730 PRINT "TO DELETE" TAB 15;"H
EY "D" "ENTER"
740 PRINT
750 PRINT "FOR NEXT "Z$;" "
760 PRINT "KEY "ENTER"
770 INPUT Z$
780 CLS
790 IF Z$="D" THEN GOTO 670
800 PRINT "N$(X) DELETED"
810 LET N$(X)=B$
820 FOR X=X TO B-1
830 LET N$(X)=N$(X+1)
840 NEXT X
850 LET N$(B)=B$
860 LET B=B-1
870 GOTO 890
880 PRINT "LAST ITEM"
890 PAUSE 100
900 GOTO 60
910 CLS
920 PRINT "NAME ?"
930 INPUT Z$
940 LET F=0
950 LET X=1
```

```
960 CLS
970 PRINT "SEARCHING..." Z$
980 IF N$(X, TO LEN Z$) <> Z$ THEN
GOTO 1030
990 LET F=1
1000 LET Y=X
1010 LET T$=N$(X)
1020 PRINT T$
1030 LET X=X+1
1040 IF X=B THEN GOTO 980
1050 PRINT
1060 IF F=0 THEN PRINT " "; Z$
"NOT FOUND"
1070 IF F=1 THEN PRINT "NO MORE
"; Z$
1080 PRINT "ON LIST"
1090 IF F<>1 THEN GOTO 1140
1100 FOR X=Y TO 2 STEP -1
1110 LET N$(X)=N$(X-1)
1120 NEXT X
1130 LET N$(1)=T$
1140 GOTO 80
1150 CLS
1160 PRINT "LAST 4 DIGITS OF NUM
BER ?"
1170 INPUT Z$
1180 LET F=0
1190 LET X=1
1200 CLS
1210 PRINT "SEARCHING..." Z$
1220 IF N$(X,29 TO 32) <> Z$ THEN
GOTO 1250
1230 LET F=1
1240 PRINT N$(X)
1250 LET X=X+1
1260 IF X=B THEN GOTO 1220
1270 IF F=0 THEN PRINT Z$," NOT
LISTED"
1280 GOTO 70
1290 CLS
1300 PRINT AT 10,10,"START TAPE"
TAB 10;"KEY "ENTER"
1310 INPUT Z$
1320 SAVE "FONE"
1330 GOTO 1
```

TIMELINEZ
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